

**REMARKS**

By the present amendment and response, independent claims 1 and 12 have been amended to overcome the Examiner's objections. Claims 1-21 are pending in the present application. Reconsideration and allowance of pending claims 1-21 in view of the following remarks are requested.

The Examiner has objected to the abstract. Applicant has amended the abstract as suggested by the Examiner.

The Examiner has rejected claims 1-5, 8-16, and 19-21 under 35 USC §102(e) as being anticipated by U.S. patent number 6,492,711 to Takagi et al. ("Takagi"). For the reasons discussed below, Applicant respectfully submits that the present invention, as defined by amended independent claims 1 and 12, is patentably distinguishable over Takagi. However, Applicant reserves the right to provide declarations and/or documents under 37 CFR §1.131 to "swear behind" the effective filing date of Takagi.

Subject to Applicant's reserved right to establish priority of the present invention under 37 CFR §1.131, Applicant submits that the present invention, as defined by amended independent claim 1, teaches, among other things, a concentration of a second material having a step increase at a first depth in a base so as to counteract a change in band gap caused by a concentration of a first material at the first depth. As disclosed in the present application, the present invention provides a step increase of a material, such as germanium, at a first depth in a base to compensate for the addition of a dopant diffusion suppressant, such as carbon, at the first depth. As a result, the present invention

provides a linear decrease in band gap from a second depth to a third depth in the base, where the first depth is situated between the second depth and the third depth.

Accordingly, the present invention advantageously provides a constant electric field, i.e. an electric field without a discontinuity, from the second depth to the third depth in the base. By providing a constant electric field from the second depth to the third depth in the base, the present invention advantageously achieves a corresponding increase in HBT performance.

In contrast to the present invention as defined by amended independent claim 1, Takagi does not teach, disclose, or suggest a concentration of a second material having a step increase at a first depth in a base so as to counteract a change in band gap caused by a concentration of a first material at the first depth. Takagi specifically discloses a SiGeC-HBT including SiGeC layer 4, which acts as a base, Si layer 5, which acts as an emitter, and Si epitaxial layer 20, which acts as a collector. See, for example, column 21, lines 18-28 and Figure 13b of Takagi. In Takagi, in bottom layer 4b of SiGeC layer 4 (i.e. the base), the Ge (germanium) and C (carbon) contents gradually decrease in the direction from center layer 4a of SiGeC layer 4 to Si epitaxial layer 20 (i.e. the collector). See, for example, column 21, lines 29-32 and Figure 13b of Takagi. Also in Takagi, in top layer 4c of SiGeC layer 4 (i.e. the base), the Ge and C contents gradually increase in the direction from Si layer 5 (i.e. the emitter) to center layer 4a of SiGeC layer 4. See, for example, column 21, lines 32-35 and Figure 13b of Takagi.

Thus, in Takagi, the increase in Ge content in SiGeC layer 4 (i.e. the base) is gradual and, consequently, does not include a step increase. Moreover, Takagi fails to teach, disclose, or suggest a concentration of a second material having a step increase at a first depth in a base so as to counteract a change in band gap caused by a concentration of a first material at the first depth.

For the foregoing reasons, Applicant respectfully submits that the present invention, as defined by amended independent claim 1, is not suggested, disclosed, or taught by Takagi. As such, the present invention, as defined by amended independent claim 1, is patentably distinguishable over Takagi. Thus claims 2-5 and 8-11 depending from amended independent claim 1 are, *a fortiori*, also patentably distinguishable over Takagi for at least the reasons presented above and also for additional limitations contained in each dependent claim.

The present invention, as defined by amended independent claim 12, teaches a method for fabricating the heterojunction bipolar transistor disclosed in amended independent claim 1. Thus, for similar reasons as discussed above, amended independent claim 12 is also patentably distinguishable over Takagi. As such, claims 13-16 and 19-21 depending from amended independent claim 12 are, *a fortiori*, also patentably distinguishable over Takagi for at least the reasons presented above and also for additional limitations contained in each dependent claim.

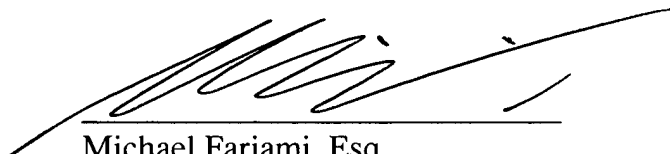
The Examiner has further rejected claims 6-7 and 17-18 under 35 USC §103(a) as being unpatentable over Takagi. As discussed above, amended independent claims 1 and

12 are patentably distinguishable over Takagi and, as such, claims 6-7 depending from amended independent claim 1 and claims 17-18 depending from amended independent claim 12 are, *a fortiori*, also patentably distinguishable over Takagi for at least the reasons presented above and also for additional limitations contained in each dependent claim.

Based on the foregoing reasons, the present invention, as defined by amended independent claims 1 and 12 and claims depending therefrom, is patentably distinguishable over the art cited by the Examiner. Thus, claims 1-21 pending in the present application are patentably distinguishable over the art cited by the Examiner. As such, and for all the foregoing reasons, an early allowance of claims 1-21 pending in the present application is respectfully requested.

Respectfully Submitted,  
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